

REMARKS

Claims 7-19 are pending in the above identified application. The Examiner has rejected claims 7-19 under 35 U.S.C. § 103(a) as being allegedly unpatentable over Applicants' admitted prior art (AAPA) in view of Ishaque (U.S. 5,288,989) and Possin (U.S. 5,777,355). Applicants herein traverse these rejections.

Independent claims 7, 11, and 16 have been amended to include the limitation "wherein the second passivation layer suppress lateral leakage current between collection electrodes." The combination of prior art does not teach this restriction. The AAPA teaches a single passivation layer between the collection electrodes. Ishaque, although teaching a dual passivation layer, does not teach the limitation "wherein the first passivation layer and the second passivation suppress lateral leakage current between collection electrodes." Possin also does not cure this defect.

I. Claims 7-19 are allowable over the combination of AAPA, Ishaque, and Possin

Applicants fully incorporate the remarks section of the response filed on December 16, 2004. Further, applicants do not acquiesce to the Examiner's arguments in the present Office Action regarding the issues raised in that response.

In particular, the prior art cited by the Examiner does not teach "depositing a first passivation layer over the plurality of source-drain metal contacts and the substrate; depositing a second passivation layer over the first passivation layer; . . . depositing a continuous layer of i a-Si disposed on the second passivation layer and the first doped a-Si layer; . . . wherein the second passivation layer suppress lateral leakage current between collection electrodes; . . .," as is recited in claim 7, "depositing a first passivation layer over the plurality of source-drain metal contacts and the substrate; depositing a second passivation layer over the first passivation layer;

. . . depositing a continuous layer of i a-Si disposed on the second passivation layer and over the first doped a-Si layer; . . . wherein the second passivation suppress lateral leakage current between collection electrodes,” as is recited in claim 11, or “depositing a first passivation layer over the source-drain metal contact; depositing a second passivation layer over the first passivation layer; . . . depositing sensor material comprising a continuous layer of i a-Si over the collection electrode and at least a portion of the second passivation layer; . . . wherein the second passivation suppress lateral leakage current between collection electrodes,” as is recited in claim 16.

As the Examiner has previously admitted “the AAPA does not discuss using a second passivation layer overlying the first passivation layer to prevent the conducting channels from forming between two pixel electrodes” (Office Action mailed March 4, 2003, pgs 2-3). Ishaque teaches “[a]n avalanche photodiode (APD) [with] a two tier passivation layer disposed over the silicon APD body.” (Ishaque, abstract). Ishaque describes that “an avalanche photodiode (APD) includes an APD body, a bottom contact pad, a top contact pad, and a two-tier passivation layer.” (Ishaque, col. 3, lines 26-29). As further taught in Ishaque, “[t]he two-tier passivation layer is disposed over the APD body so as to cover the outer periphery of the APD body except at a selected contact area with the top contact.” (Ishaque, col. 3, lines 42-45).

The photodiode structure taught in Ishaque et al. is drastically different from the high fill-factor array taught and claimed by Applicants. Applicants’ claimed structure includes conduction layers deposited on a substrate with first and second passivation layers deposited on the substrate between the conduction layers and a a-Si semiconductor layer deposited on a portion of the second passivation layer. The second passivation layer has the effect of reducing the lateral leakage current between the electrodes.

In Ishaque et al., however, the photodiode structure includes a semiconductor deposited directly on the substrate with an electrode deposited on the semiconductor and a two-tier passivation layer deposited over the structure, where one of the two-tier passivation layers forms a barrier layer. This second passivation layer does not reduce lateral leakage in the structure taught by Ishaque et al. and there is no teachings in Ishaque et al. that would suggest utilizing a second barrier layer in Applicants' structure -- there is no need for a barrier layer in the structure claimed by Applicants.

The combination of Ishaque et al. and the AAPA does not, therefore, teach deposition of a second passivation layer in AAPA because there would be no motivation for one skilled in the art to place a barrier layer into Applicants' high fill factor array structure. The structures taught by Applicant and the structure taught by Ishaque et al. are widely different and the passivation layers have largely different purposes and effect.

Therefore, neither the AAPA nor Ishaque, or their combination, teaches "depositing a first passivation layer over the plurality of source-drain metal contacts and the substrate; depositing a second passivation layer over the first passivation layer; . . . depositing a continuous layer of i a-Si disposed on the second passivation layer and the first doped a-Si layer; . . . wherein the second passivation layer suppress lateral leakage current between collection electrodes; . . .," as is recited in claim 7, "depositing a first passivation layer over the plurality of source-drain metal contacts and the substrate; depositing a second passivation layer over the first passivation layer; . . . depositing a continuous layer of i a-Si disposed on the second passivation layer and over the first doped a-Si layer; . . . wherein the second passivation suppress lateral leakage current between collection electrodes," as is recited in claim 11, or "depositing a first passivation layer over the source-drain metal contact; depositing a second passivation layer over

the first passivation layer; . . . depositing sensor material comprising a continuous layer of i a-Si over the collection electrode and at least a portion of the second passivation layer; . . . wherein the second passivation suppress lateral leakage current between collection electrodes,” as is recited in claim 16.

Furthermore, Possin fails to cure the defects in the teachings of the AAPA and Ishaque. Possin fails to disclose or suggest a second passivation layer to suppress lateral leakage current.

Claims 7 and 11 are therefore allowable over AAPA in view of Ishaque and Possin. Claims 8 through 10 depend from claim 7 and are therefore allowable over this art for at least the same reasons as is claim 7. Claims 12 through 15 depend from claim 11 and are therefore allowable for at least the same reasons as is claim 11. Claims 17-19 depend from claim 16 and are therefore allowable for at least the same reasons as is claim 16.

The Examiner has commented that “one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references.” (Office Action, page 8-9). Applicants maintain that the combination of the references cited by the Examiner do not teach the claims as previously presented, nonetheless applicants have amended the current claims to include the limitation “wherein the second passivation suppress lateral leakage current between collection electrodes.” The combination of references cited by the Examiner does not teach these combinations of limitations.

II. There is no motivation to combine the AAPA and Ishaque.

As was thoroughly discussed in the response filed on December 16, 2004, there is no motivation to combine the AAPA and Ishaque. However, the Examiner has maintained these

rejections of the claims. Herein, applicants address several of the Examiner's comments regarding the motivation to combine AAPA with Ishaque.

There must be some motivation to combine these references found in the references themselves or in the knowledge of those skilled in the art. *See* MPEP 2143.01. The Examiner has suggested several motivations to combine AAPA with Ishaque. In particular, the Examiner has suggested that a motivation to combine is "to use a passivation layer that reduces capacitive coupling between device structures as is known in the art, and provides a moisture barrier to the improved passivation layer as taught by Ishaque in column 7, lines 21-42." Office Action, p. 9. Further, the Examiner has suggested a motivation "in order to differentiate the device into a plurality of devices, thus creating an array, which results in cost savings over having to make a plurality of devices separately." Office Action, p. 9. In the case of motivation of reducing capacitive coupling and separating devices, the AAPA performs both of these functions itself and does not need the addition of a second passivation layer as taught by Ishaque to fulfill this function. These "motivations" are therefore not motivations to combine AAPA with Ishaque. With regard to the motivation of providing a moisture barrier, a layer that does not cover a significant portion of the device does not make a moisture barrier. Further, there is no need of a moisture barrier at a point where the barrier layers are fully encapsulated in the device, as is the case with the AAPA. Therefore, to provide a moisture barrier also can not serve as a motivation to combine AAPA with Ishaque.

With regard to whether Ishaque teaches away from the invention, the Examiner comments that "Ishaque deposits the light sensitive material before depositing the polyimide and therefore must be concerned with the polyimide anneal temperature . . . [but] . . . the AAPA deposits the light sensitive amorphous silicon layers after any polyimide formation and anneal,

therefore would not suffer from the same affects which applicant contends are detrimental to the combination.” Office Action, p. 10. The Examiner does not deny that Ishaque teaches away from the use of amorphous silicon in the structure. Moreover, the Examiner’s argument reveals how different the structure taught in Ishaque is from the structure taught from AAPA and further provides evidence that there would be no motivation to combine the AAPA with Ishaque. Simply put, one skilled in the art would not recognize the teachings of Ishaque to be applicable to the structure taught in the AAPA at all.

The Examiner continually asserts that Ishaque is analogous art because “both the AAPA and Ishaque are directed toward detecting electromagnetic radiation,” Office Action, p. 10-11. However, as indicated above, the structural and material differences between photo-diode structures and Applicants’ full fill-factor imaging arrays are too different to expect one of ordinary skill in the art, even knowing of the teachings of Ishaque, to look to Ishaque for processes and structures that relate to a full-fill imaging array.

Therefore, there is no motivation to combine Ishaque with the AAPA in the fashion suggested by the Examiner. As discussed, Ishaque teaches away from aspects of the invention claimed in claims 7, 11, and 16. Furthermore, modification of Ishaque in the fashion suggested by the Examiner results in the invention of Ishaque becoming inoperable for its intended purpose, as taught in Ishaque itself. Therefore, Applicants respectfully request that the Examiner reconsider the rejections of claims 7 through 19 based on this art.

Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request that the Examiner enter the present Amendment, which renders the claims allowable or places them in better form for appeal. Applicants request the Examiner's reconsideration and reexamination of this application and the timely allowance of the pending claims.

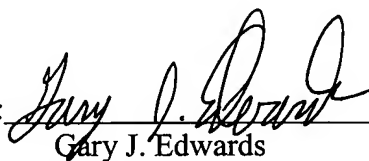
Please grant any extensions of time required to enter this response and charge any additional required fees to Xerox Deposit Account 24-0037.

Respectfully submitted,

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